

50 STANDARDS FOR *Satisfaction*



FLEUR-O-LIER
Manufacturers



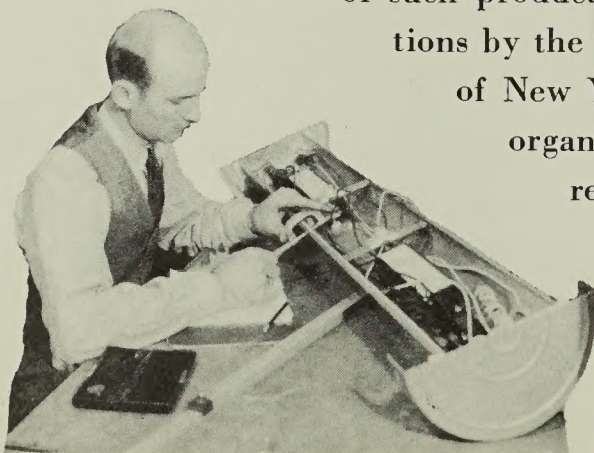
When, less than three short years ago, the fluorescent lamp was produced for practical lighting application, the lighting fixture industry was, to a certain degree, unprepared for the amazing public demand which followed the perfection of this revolutionary light source. Since the fluorescent lamp required special control equipment for satisfactory operation and since luminaires had to be devised to use this new lamp efficiently, there was for a time a period of uncertainty, exaggeration and misuse.

Realizing that the success of the tubes depended on proper operation, MAZDA lamp manufacturers became vitally concerned over this problem. To guarantee a wholesome, widespread public acceptance of fluorescent lighting, lamp manufacturers knew that they must assure the buyer somehow that he could get quality, long life and good value in fixtures.

Lamp manufacturers' engineers called upon their collective skill to devise a minimum of at least 50 performance specifications for electrical, mechanical and illuminating excellence of fluorescent lighting fixtures.

A group of fixture manufacturers, realizing the necessity and importance of such a set of specifications, decided on a cooperative program. They agreed to manufacture fluorescent fixtures under the lamp manufacturers' specifications . . . to have random samples

of such products certified under the specifications by the Electrical Testing Laboratories of New York, nationally known testing organization. This certification, as represented by the label shown, is a definite and uncompro-



General inspection of fluorescent unit. The body of the luminaire must pass many requirements of physical strength, electrical safety, etc., in addition to the illuminating requirements.

mising challenge to buyers of equipment to specify the one known type of equipment that is so built, so inspected, so certified that it assures immediate satisfactory performance and minimizes the grief usually considered a necessary part of experience in the use of any new product. Thus the "Certified FLEUR-O-LIER" came into existence.

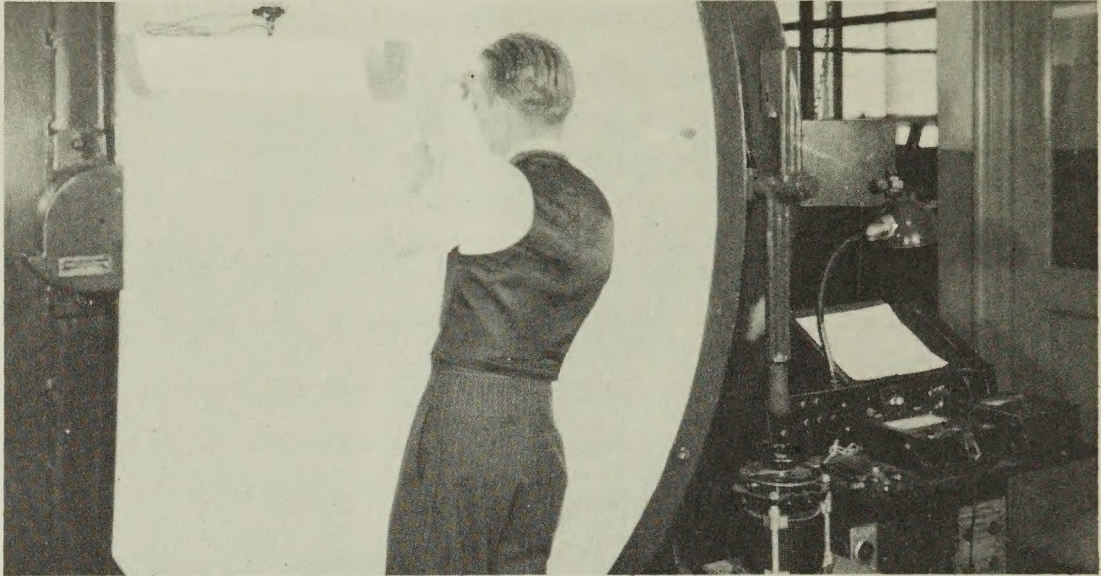
The cooperative program—expressed in a single word, "Fleur-O-Lier"—represents the complete coordination of every factor in a chain of successful operations.



This program, under the name Fleur-O-Lier Manufacturers, is open to anyone manufacturing fluorescent equipment. There are no initiation fees and no dues. Manufacturers contribute to the expense of testing and field inspection service on the part of Electrical Testing Laboratories, and also to a common promotion program by the payment of a few cents for each certified piece of equipment which they sell.

Contract with the Electrical Testing Laboratories for their service may be entered into or cancelled on 24 hours notice. All of the contributions for advertising and promotion are expended for that purpose and no part of them is extended for overhead of any kind, or for traveling, etc. A CP audit on these funds will be sent to each participating manufacturer at least once a year.

Measuring efficiency of utilization of light, using the 100-inch photometric sphere. This measurement gives the percentage of the light given off by the lamps alone compared with the light produced when all reflectors and accessories are in place.



5 TESTS FOR LIGHTING EFFECTIVENESS

1 **Brightness.** Lamps shall, in general, be shielded from view, especially in fixtures designed for offices, schools, auditoriums and for other locations where exacting visual work is done or where lamps are in the normal field of view for extensive periods of time. For such locations, fixtures should be chosen in which the lamp is shielded from direct view by the use of light-diffusing reflectors, louvers and shades.

For certain purposes, the unshielded lamp may be satisfactory provided its location is such that high brightness is not in the normal line of vision.

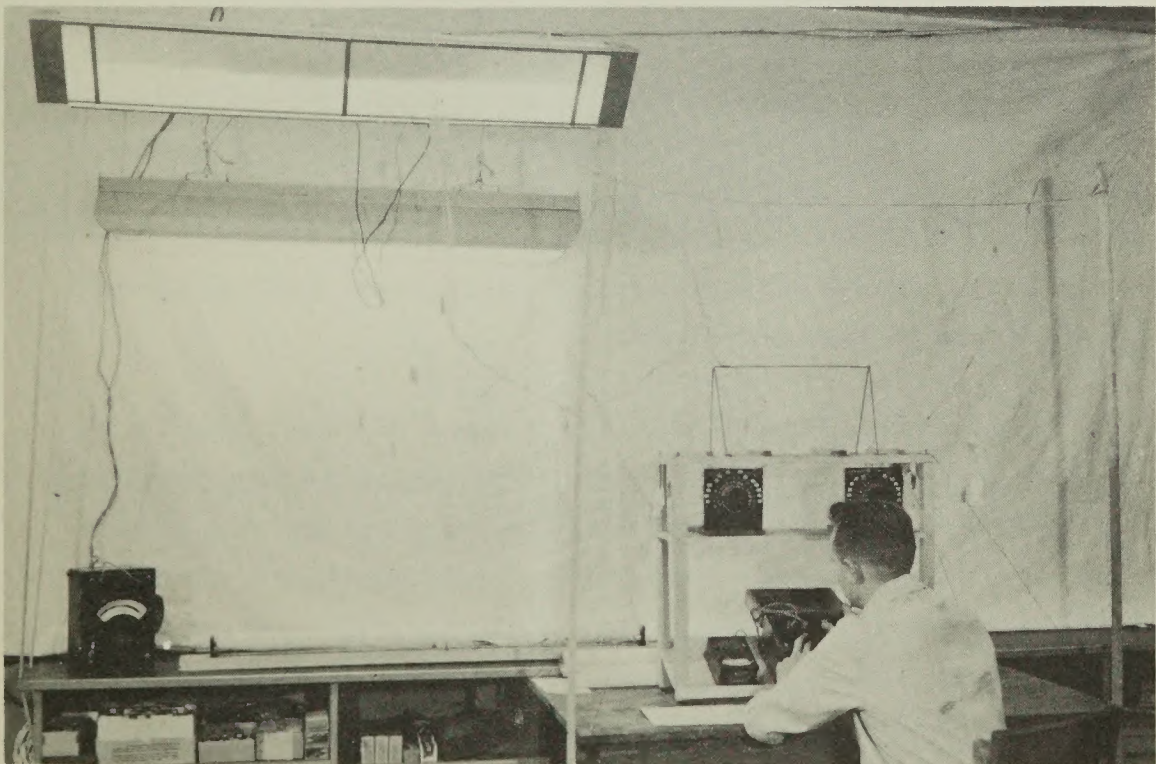
2 **Light output.** In fixtures in which the redirective equipment is employed, needless absorption of light should be avoided. The light output from the complete fixture should be at least 65% of that of the lamp for shielded lamps and 75% for unshielded lamps.

Some luminaires for special application, such as decorative units, showcase units, etc., will be given consideration as exceptions to this rule.

3 *Flicker.* All luminaires which are built for exacting visual work shall be so designed that they will not produce annoying flicker.

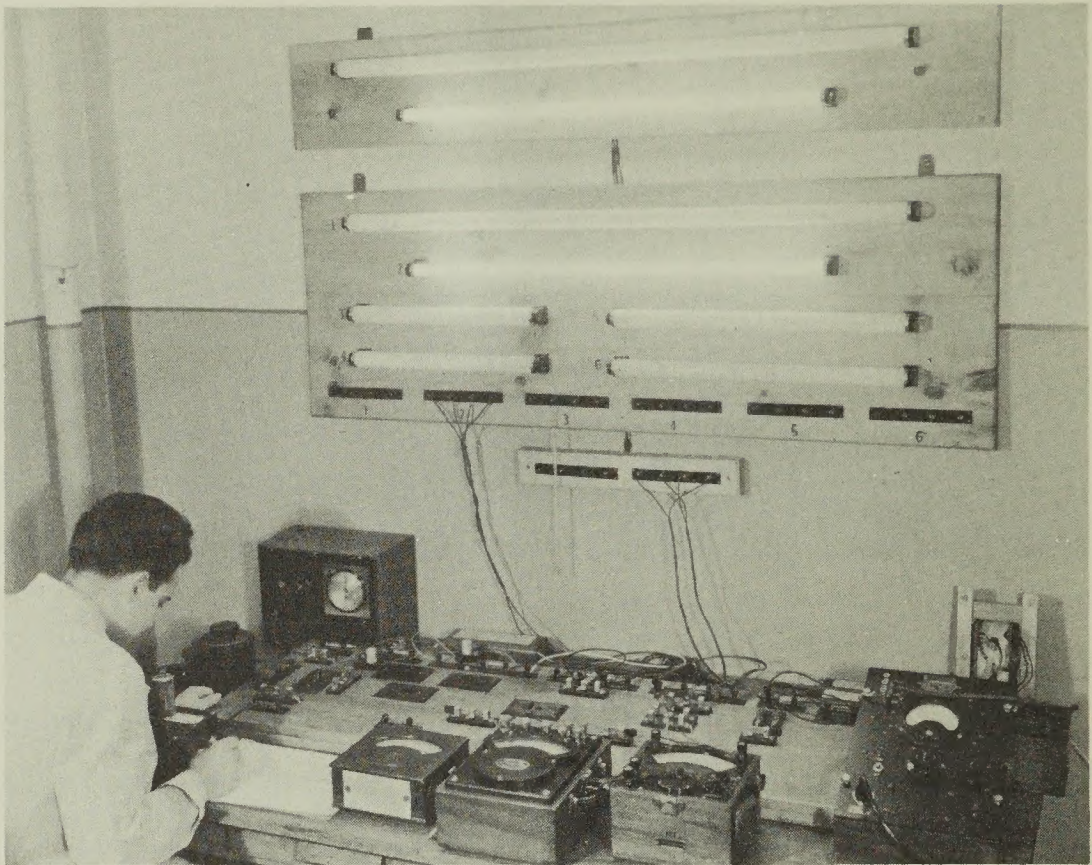
4 *Candlepower distribution.* Because of the great variety of possible applications, it is impracticable to prescribe desirable candlepower distribution characteristics for each use. However, it is preferable to state illumination on the work plane instead of indicating candlepower distribution. In every case, both typical candlepower distribution and illumination value shall be shown.

5 *Materials.* The materials used to redirect the light shall not only be reasonably efficient but shall maintain this efficiency for the useful life of this equipment.



Measuring temperatures attained in various parts of a Fleur-O-Lier when one or several lamps have failed. Thermocouples attached to the ballast, compensator, etc., measure the rises in temperature.

Checking performance of fluorescent lamp ballasts. The ballast under test is operated in comparison with a standard ballast, and must operate within prescribed limits.



6 TESTS FOR ELECTRICAL SAFETY

1 *Approved Material.* In connection with provisions for avoidance of fire hazard, all elements of the assembly which are included in the listing service of Underwriters' Laboratories shall be covered by the listing of that organization.

2 *Approved-voltage Test.* The fixture, initially, shall withstand the application of 2000 volts (60-cycle alternating current) for one minute between current-carrying parts and any non-current-carrying metal parts—the lamp being at existing room temperature and humidity with the line switch disconnected.

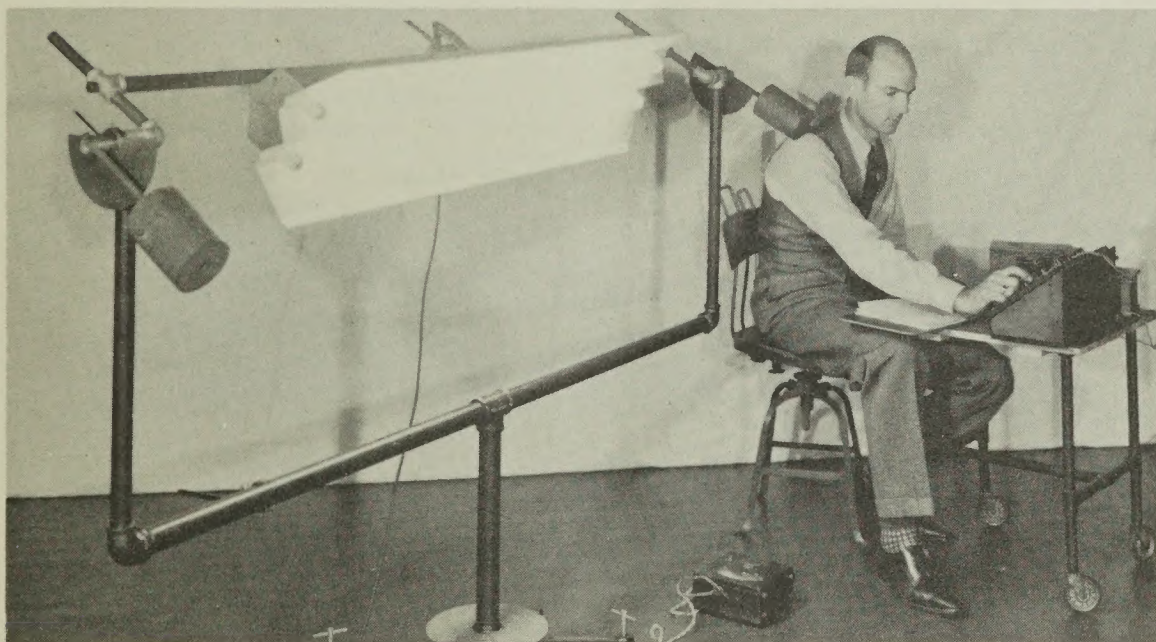
3 *Temperature.* The temperature rise of exposed surfaces due to lamp operation shall not exceed one hundred degrees Fahrenheit.

4 **Leakage Current.** To insure avoidance of electric shock in the case of luminaires designed for use in readily accessible locations.

5 **Bushings and Wireways.** All points at which coverings of conductors would be subject to injury shall be protected. Wireways shall be smooth throughout. Ample room in the wireways shall be provided for the conductor to prevent crowding or cramping the wires.

6 **Exposed Edges.** The edges of metal parts which are exposed shall be free from sharp edges capable of doing personal injury.

Distribution photometry. The light output in all directions around a plane and at several points of rotation about a center axis, is measured by means of a photoelectric cell.



18 TESTS FOR MECHANICAL SOUNDNESS

1. The fixture in its parts and as an assembly shall be constructed mechanically so as to withstand, without damage, the application of any force or strain to which it is likely to be subjected in service.

2. The construction of the assembled fixture shall be such as to assure adequate durability under normal service conditions.

3. The luminaire as a whole should be capable of sustaining, without deformation or buckling, any additional weights, strains or stresses which might be expected in service.

4. Vents to permit circulation of air through the space occupied by the auxiliaries shall be provided if required.

5. Corrodable material shall be covered with suitable protective coating, and finish of all parts will be such as will not peel, be easily damaged or marred during installation or after being placed in service.

6. Design and construction of fixture should be such as to facilitate cleaning and prevent deterioration.

7. No equipment of any nature whatsoever should be attached to the glass tube of the lamp nor shall any metal part come closer than one-eighth of an inch to the glass tube except the starter which may have a clearance as small as one-sixteenth of an inch.

8. Portable fixtures shall be so constructed that the assembled lamp shall not tip over when placed on a plane tilted at an angle of 10 degrees in any direction to the horizontal.

9. Under special conditions of the National Electrical Code certain grounding is required with a third conductor.

10. The assembly of the lampholder shall be such that all live metal parts are protected from personal contact.

11. Insulation between live metal parts of the lampholder and mounting surfaces shall withstand 2000 volts.

12. Binding screws and terminals shall be protected from contact with metal surfaces by insulation capable of withstanding potential of not less than 2000 volts.

13. Contact of lampholder shall be flexible enough to permit easy insertion and removal of the lamp.

14. Lampholder shall be of such design that lamps will be firmly held in place during use.

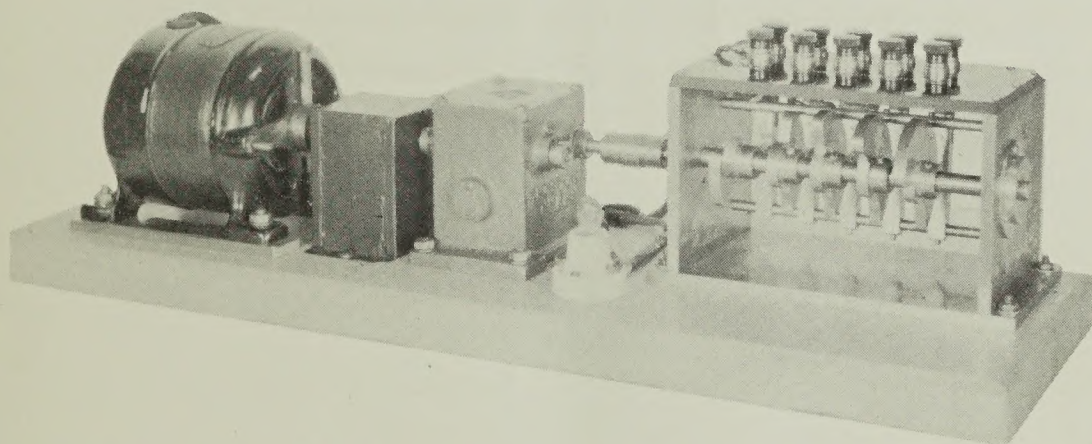
15. Lampholder shall be fastened securely to the mounting surface. If one-screw mounting is used, provision must be made to prevent lampholder from turning.

16. When mounted in fixture, auxiliaries and ballasts shall be held firmly in place.

17. When mounted in fixture, auxiliaries and ballasts shall be accessible for replacement.

18. Under proper electrical operation, an auxiliary shall not exude objectionable material nor shall its equilibrium temperature under the conditions exceed 105 degrees C. or 220 degrees F. (at ambient of 40 degrees C. or 104 degrees F.).

Fluorescent lamp starting switch.



14 TESTS FOR ELECTRICAL EXCELLENCE

1. **Marking.** Unless definitely designed for direct current operation, the luminaire should be plainly marked, "for AC operation only."

2. **Wiring.** All electrical work on the luminaire shall conform with standard wiring practice. All wire used shall have Underwriters' Laboratory's listing or labels.

3. If the assembled luminaire is provided with a line switch, it should be of a type listed by Underwriters' Laboratories.

4. *Power Factor.* The over-all power factor of the luminaire with all lamps burning shall be in excess of 0.85 lag. If power factor correcting equipment is separate from the auxiliary, room shall be provided in the luminaire for its installation.

5. The auxiliary shall be made in accordance with the latest issue of MAZDA lamp manufacturers' "specifications for the fluorescent lamp auxiliary."

6. All auxiliaries must bear the certification label of the Electrical Testing Laboratories.

7. Electric cord supplied with portable luminaires for attachment to outlet shall be not less than 7 feet long, outside the base, except where local ordinance restricts this length.

8. All cords shall carry the "five-foot label" of the Underwriters' Laboratories.

9. All cords installed in lamps shall be provided with an adequate stress release inside the base.

10. Electric cord must have rubber insulation compound of a composition which will not adversely affect the copper conductors.

11. Auxiliaries shall be rated at a specific voltage and frequency. Auxiliaries operating throughout the range from 110 to 125 nominal line volts shall be rated at 118 volts, and equipment rated at other line voltages shall be designed to operate throughout the same proportional range. Rated frequency shall be 60 cycles unless 50-cycle auxiliaries are specified.

12. Lamps shall start from preheated cathodes with good reliability and within a reasonable time, certainly not more than ten seconds.

13. If the starting switch of the unit is incorporated as an integral part of the auxiliary preventing replacement or substitution, lamp starting specifications and tests shall apply to the complete unit.

14. After the lamp has started no energy shall be supplied to heat the cathode except that supplied by the arc itself.

Here a skilled technician places a 100-watt fluorescent lamp in giant "electric eye" that measures light output.



7 SPECIFICATIONS FOR PERFORMANCE OF AUXILIARY EQUIPMENT

1. *Safety*—auxiliary shall withstand continuous operation with the lamp arc short circuited, without exuding insulating compound and without producing temperature in excess of 105 degrees C. or 220 degrees F. (at ambient of 40 degrees C. or 104 degrees F.) on any surface with which insulated wires may make contact. Listing by Underwriters' Laboratories shall be considered evidence of compliance.



*Life test of fluorescent lamp starters.
The starters are wired to one cathode of each of two
lamps, equivalent to failed-lamp conditions, and operated
continuously until failure, when they are opened for examination.*

2. *Wattage loss*—the wattage loss of the auxiliary, as certified by the Testing Laboratories, shall be designated on the auxiliary in a manner acceptable to the Laboratories.

3. The over-all power factor of the auxiliary and lamp circuit, as certified by the Testing Laboratory, shall be designated on the auxiliary in a manner acceptable to the Laboratory.

4. *Noise*—the auxiliary shall be satisfactorily quiet in operation when tested under the lowest levels of extraneous noise normally anticipated in service, and shall remain so after shipment and in service.

5. *Radio interference*—the auxiliary shall contain a small capacitor connected across opposite lamp electrodes to reduce radio interference.

6. *Starter life*—starters shall not be permanently impaired by functioning continuously for a reasonable period under failed-lamp conditions. Such periods shall not be less than 20 hours for separable starters and not less than 50 hours for integral starters.

7. *General*—an auxiliary may be considered unacceptable if it possesses any unsatisfactory characteristics or deficiencies which materially impair its performance.



FLEUR-O-LIER

**NOT THE NAME OF A NEW PRODUCT—
*BUT THE MARK OF EXCELLENCE***



In the brief two years of the existence of Fleur-O-Lier Manufacturers there has been recorded an enviable record of minimum complaints and maximum satisfaction to users.

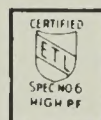
Service to the public does not stop with the manufacture of Certified equipment. Members of the Fleur-O-Lier group receive up-to-date bulletined information on development, experiences, uses, engineering problems and other important information developed from the experiences and tests of all makers, assemblers and fabricators in the group. This results in constant improvements of units as well as continued new designing of fixtures to fit all types of decoration.

It pays to specify and buy Fleur-O-Lier equipment because it means Certified equipment, produced by manufacturers who are systematically supplied with the most up-to-date information on fluorescent lighting.

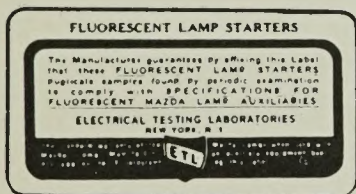
THESE ARE IDENTIFYING CERTIFICATION LABELS OF FLEUR-O-LIERS AND AUXILIARY EQUIPMENT



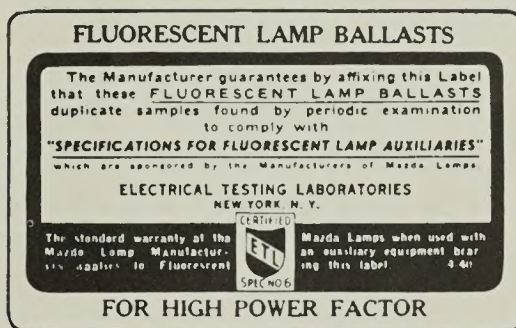
Printing on starter.



*Metal stamp used
on ballast.*



*Placed on shipping boxes
of starters.*



*Placed on shipping boxes
of ballast.*



Label for cases of channel strip.



Label for complete Fleur-O-Lier.

Ref 0475



FOR FURTHER INFORMATION

Write

FLEUR-O-LIER MANUFACTURERS

2116 KEITH BUILDING • CLEVELAND, OHIO

